THE
ONTARIO WATER RESOURCES
COMMISSION

REPORT ON

A

WATER RESOURCES SURVEY

COUNTY OF ELGIN

A SURVEY OF WATER RESOURCES
AND STREAM POLLUTION WITH
RECOMMENDED PROGRAMS

AUGUST 1959

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PARLIAMENT BUILDINGS - TORONTO

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WATER RESOURCES SURVEY

County of Elgin

A survey of water resources
and stream pollution with
recommended programs

Date: August, 1959.

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WATER RESOURCES SURVEY

- County of Elgin -

INDEX

CHAPTER I

CHAPTER 2

CHAPTER 3

- FIGURES -

- TABLE -

INTERPRETATION OF ANALYSES

For convenience in the interpretation of laboratory analyses it may be taken as an objective that pollution in streams should not exceed the following figures ---

B.O.D. (Biological Oxygen Demand) 4 ppm. (parts per million)
Coliform Counts (M.P.N. - Most Probable Number) 2400

Similarly the effluents from drains or sewage plants should have, as objectives, figures not in excess of the following ---

B.O.D. 15 ppm.
S.S. 15 ppm.

WATER RESOURCES SURVEY

- COUNTY of ELGIN -

CHAPTER 1

SUMMARY AND RECOMMENDATIONS

SUMMARY

This report records the results of a preliminary survey of water supply and stream pollution in the County of Elgin made by the Ontario Water Resources Commission during 1958 and 1959. Attention has been given to the sources of water supply, treatment, distribution and future water requirements of the municipalities. The effect of pollution on the streams and lakes has been examined because of its importance to the use of water. These must be regarded as essential to the welfare and future development of the county.

A summary of the results of this survey is as follows:

1. Approximately one half of the population in the county is served by municipal water works systems. A number of municipalities are in need of water works. Growth of these municipalities will be closely associated with the availability of adequate supplies of water.

2. In some areas geological conditions are favourable for the development of ground water supplies. In others, it may be necessary to develop surface sources of water.

3. Most of the shallow dug wells which are common throughout the county have inadequate supplies of water. Drilled overburden wells provide the most dependable supplies of good quality ground water. The drilled rock wells generally contain varying amounts of hydrogen sulphide in the water. About 10 percent of the drilled wells in the county contain hydrogen sulphide.

4. The fact that the county is bordered along the entire length of its southern boundary by Lake Erie will have a predominant influence on the development and use of water in the adjacent municipalities. Lake Erie water will be utilized increasingly, whenever it is economically feasible to do so, as shortages occur in the urban areas of the county.

5. The county has an important agricultural development, with corn, soya beans, tobacco and rye the chief cash crops. Dairy farming is also an important industry. The use of irrigation in this agricultural section has increased to the point where almost 50 percent of the farm areas are irrigated.

6. The problems of water supply exist at present in the following municipalities.

(a) - The City of St. Thomas is continuously faced with the difficulty of supplying good quality water. This is recognized as essentially a difficulty in the treatment of an inferior raw water supply. If a source other than Kettle Creek were available to supply adequate amounts of uniform quality water many of the difficulties would be eliminated.

The use of reservoirs in Kettle Creek for water supply has restricted the amount of water that would otherwise be available for sewage dilution. This will increase the degree of treatment required for sewage and other wastes and introduce complications.

(b) - The Villages of Port Burwell, Springfield and Vienna are in need of water works systems.

(c) - A number of small communities require dependable supplies of water.

7. Pollution is associated with the urban areas of the county where adjacent watercourses receive partially treated or untreated waste discharges. The most seriously affected streams are Kettle and Catfish Creeks, particularly the latter, where waste effluents have received little or no treatment.

8. Supervision of private sewage disposal systems has been good as carried out by the officials of the Elgin - St. Thomas Health Unit. The use of septic tank disposal systems will require continued supervision to control sanitary conditions where these private systems are employed.

RECOMMENDATIONS

The conclusions and recommendations based on this survey of water resources in the county are:

1. A continuous appraisal of water conditions in the county and adequate planning to meet the needs of the population should be maintained by municipal authorities.

2. Pollution control measures in all surface waters must be continued to insure the maximum beneficial use of these water resources at all times for recreational, agricultural and water supply purposes.

3. The recommendations for water supply and stream pollution control programmes for the individual municipalities are as follows:

(1) City of St. Thomas

(a) - Lake Erie be regarded as the most reliable source of uniform quality water and steps be taken by the city to develop it as the future source of supply.

(b) - abatement of pollution in Kettle Creek be brought about through the treatment of industrial wastes by the responsible industries and that industrial and residential areas outside the city be included where possible in the sewer system for treatment at the sewage purification works.

(2) Town of Aylmer

(a) - a programme of test-drilling be undertaken to provide an adequate water reserve for the town.

(b) - a municipal sewage works programme be undertaken to include the treatment of all sanitary wastes and to include in this industrial waste effluents where possible in preference to their individual treatment.

(3) Villages of Dutton, Rodney and West Lorne

(a) - the future requirements of water for the three municipalities and the adjacent areas be met through the development of the existing water works system.

(b) - continued supervision be given to private septic tank systems in order to control pollution in the streams and surface water drains.

(4) Village of Port Burwell

(a) - a municipal water works system be installed with Lake Erie or Otter Creek as the source of supply.

(b) - all private sewage disposal systems discharging into Otter Creek be investigated.

(5) Village of Port Stanley

(a) - the existing water treatment plant be enlarged as required to meet future demands.

(b) - consideration be given to a municipal sewage works programme to provide for the collection and treatment of domestic and industrial wastes before discharge into Lake Erie.

(6) Village of Springfield

(a) - consideration be given to the development of a municipal water works system utilizing wells as the source of supply.

(b) - continued supervision be exercised over private sewage disposal systems to eliminate the discharge of sanitary wastes to Catfish Creek.

(7) Village of Vienna

(a) - consideration be given to the development of a municipal water works system; studies to be made on the flow and quality of Otter Creek with a view to utilizing it as a source of supply for the village.

(b) - continued supervision be given to septic tank and field tile disposal systems employed for sewage treatment.

(8) Townships

(a) - use be made of all available well data and geological information in the development of ground-water supplies.

(b) - a supply of water from Lake Erie be considered where urban water systems are contemplated.

(c) - extension of existing sewage works be considered to serve the urban areas in the townships.

(d) - continued supervision be given to individual septic tank systems for control of pollution in the watercourses of the county.

WATER RESOURCES SURVEY

- COUNTY OF ELGIN -

CHAPTER 2

GEOGRAPHY and GEOLOGY

I Geography

1. Topography

The surface features of Elgin County are predominantly plains of stratified clay, clay till or sand which are separated by a series of east-west trending recessional moraines. The streams which flow into Lake Erie have deeply dissected the adjacent plain areas.

Steep cliffs are present along the shore of Lake Erie rising to a height of 75 feet above lake level. The range in surface elevation varies from 572 feet above sea level at Lake Erie to over 950 feet in South Dorchester Township.

2. Drainage

The county is drained by numerous streams which flow northward into the Thames River and southward into Lake Erie. The largest of these, Catfish, Kettle, Otter and Talbot Creeks, all discharge into Lake Erie. Drainage ditches are used extensively throughout the county.

3. Climate

Generally, the climate of Elgin County is comparable to that of the other counties which border Lake Erie. The climate is moderate with annual average maximum and minimum daily temperatures of approximately 97° and -14° Fahrenheit, respectively. The mean annual temperature is approximately 45° Fahrenheit and the mean annual precipitation is about 35 inches.

4. Agriculture

Corn and soya beans along with flue tobacco and rye are the most significant cash crops grown in the county. Twenty thousand acres of flue tobacco and rye are grown in the area south of St. Thomas. The growing of corn and soya beans is general throughout the county where 51,000 and 22,000 acres, respectively, are cultivated along with other grain crops.

Dairy farming also plays an important role in the agricultural economy of the county.

About one half of the farms in the county employ irrigation. Most of the water supply for this purpose is obtained from surface sources such as ponds and streams.

5. Population

The population of the County of Elgin in 1957 was 56,248 an increase of 7000 in a ten year period. The small rate of increase reflects the predominantly agricultural characteristic of the county.

II Geology

A thick mantle of overburden generally overlies the bedrock formations in Elgin County. Although considerable thicknesses of sands are present in the sand plain areas and elsewhere as lenses or layers buried within the drift, much of the overburden is composed of clay or clay till materials. This clay material comprises the ground moraine and recessional moraine features associated with the continental glaciation of the area. The stratified sands are mainly the products of melting of the glaciers or stream or lake deposits of the present or earlier interglacial periods.

Brown and buff limestones of the Delaware formation underlie the overburden from Dunwich Township eastward, while the remainder of the bedrock formations consists of grey shale and limestone of the Hamilton formation. All the bedrock formations dip gradually towards the southwest and the bedrock surface slopes in a southerly direction where thicknesses of overburden exceed 300 feet.

The water-bearing properties of the overburden are variable. Many shallow wells have been dug in the sand plain areas in which perched water tables provide a non-permanent supply. Deeper drilled wells usually obtain sufficient good quality water from buried sand formations or lenses. Most of the dependable groundwater supplies in the county are obtained from wells drilled into the overburden.

The water-bearing properties of the bedrock formations are generally poor and as a result rock wells make up a small percentage of the total number of wells drilled in the county. The quality of water from these wells is usually inferior because of the presence of varying amounts of hydrogen sulphide.

TABLE I ANALYSIS OF POLLUTION SURVEY SAMPLES

SAMPLING POINTS	DATE	LOCATION	B.O.D. (P.P.M.)	SOLIDS (P.P.M.) TOTAL	SUSP.	DISS.	MEMBRANE FILTER COLIFORM COUNT PER 100 M.L. (M.P.N.)
		ST. THOMAS					
K. 20	JULY 22/58	1ST AVE. AT N.Y.C. OVERPASS	4.3	1110	132	978	2400
K. 21	"	SMITH CARR DRAIN AT 1ST BETWEEN STEELE & MARY ST.	20	470	172	298	0
K. 22	"	DRAIN FROM N.Y.C. SHOPS	48	926	60	866	24,000
K. 23	"	WELLINGTON ST. STORM SEWER	45	498	34	464	24,000,000 +
K. 24	"	DOUGHERTY DRAIN AT FIRST AVE.	62	598	86	512	2,400,000
K. 25	"	DRAIN - WEST SIDE OF 1ST AVE. NORTH OF BRANT AVE.	50	1078	284	794	24,000,000 +
K. 26	"	DRAIN - WEST SIDE OF 1ST AVE. NORTH OF SIMCOE ST.	27	744	478	266	24,000,000 +
K. 27	"	MILL CREEK AT BRIDGE ON ELMIRA ST. NORTH OF ELM ST.	6.4	626	34	592	2,400
K. 28	"	MILL CREEK AT HWY. #4 EAST SIDE	6	656	54	602	24,000
K. 29	"	INDUSTRIAL AREA DRAIN AT WOODWORTH AVE. NORTH OF EDWARD ST.	62	786	176	610	240,000
K. 30	JULY 23/58	INDUSTRIAL DRAIN AT BALACLAVA ST. NORTH OF EDWARD ST.	2.0	424	16	408	240
K. 30	"	INDUSTRIAL DRAIN AT BALACLAVA ST. NORTH OF EDWARD ST.	6.6	362	12	350	
K. 31	"	NORTH END OF JACKSON ST. AT OWAISSA ST.	66.0	768	96	672	0
K. 32	"	UPSTREAM FROM ST. GEORGE ST. - SEPTIC TANK	3.5	326	36	290	240,000

K. 33	JULY 23/58	DOWNSTREAM FROM ST. GEORGE ST. - SEPTIC TANK	4.0	726	132	594	2,400,000
K. 34	"	INFLOW AT NEW SEWAGE TREATMENT PLANT	290.0	782	170	612	24,000
K. 35	"	EFFLUENT FROM NEW SEWAGE TREATMENT PLANT	1.6	568	34	534	240,000
K. 36	"	EFFLUENT FROM OLD SEWAGE TREATMENT PLANT	2.8	542	18	524	240,000
K. 37	"	WATERWORKS PARK - UPSTREAM FROM OUTFLOW OF SEPTIC TANK	2.6	278	16	262	2,400
K. 38	"	WATERWORKS PARK - DOWNSTREAM FROM SEPTIC TANK OUTFALL	2.1	272	30	242	240,000
K. 39	"	KETTLE CREEK - AT BRIDGE TALBOT ST. W. UNDER N.Y.C. BRIDGE	3.1	276	24	252	2,400,000
K. 40	"	KETTLE CREEK ON WEST SIDE OF 1ST BRIDGE NORTH OF TALBOT ST. ON #4 HWY.	1.6	290	22	268	2,400
K. 41	"	NORTH BRANCH (DODD CREEK) OF KETTLE CREEK AT BRIDGE AT 1ST ROAD EAST OF #4 HWY. - NORTH OF TALBOT ST.	0.9	314	24	290	240,000
K. 42	"	SOUTH BRANCH OF KETTLE CREEK AT LYNDHURST BRIDGE	4	254	14	240	24,000
K.43	"	KETTLE CREEK AT QUEEN'S BRIDGE ON #4 HWY.	2.2	312	58	254	2,400
K.44	"	KETTLE CREEK AT BREWERY BRIDGE #4 HWY.	2.8	298	14	284	24,000,000
-		CREEK FROM BURGESS LAKE	1.2	234	4	230	

AYLMER

C.41	JULY 24/58	CATFISH CREEK AT DINGLE STREET AND AIRPORT ROAD	2	308	10	298	240,000
C.42	"	CATFISH CREEK UPSTREAM FROM CARNATION PLANT OUTFALL	21	422	12	410	24,000
C.42A	"	CARNATION PLANT OUTFALL	460.0	634	204	430	
C.43	"	CATFISH CREEK DOWNSTREAM FROM CARNATION PLANT OUTFALL	14	400	20	380	240,000
C.44	"	CATFISH CREEK WEST SIDE OF JOHN ST. BRIDGE - CENTRE OF AYLMER	12	304	88	216	24,000,000 +

C.45	JULY 24/58	CANADIAN CANNERS OUTFALL	1016	1652	220	1432	2,400
C.46	"	CATFISH CREEK ABOVE OUTFALL FROM CANADIAN CANNERS AND BELOW WELLINGTON STREET DRAIN	13	392	14	378	24,000
C.47	"	CATFISH CREEK BELOW OUTFALL OF CANADIAN CANNERS DRAIN	7.6	400	44	356	240,000
B.48	"	BRADLEY CREEK ABOVE JOHN ST. SOUTH DRAIN	3.8	400	8	392	2,400
B.49	"	BRADLEY CREEK BELOW JOHN ST. SOUTH DRAIN	23	482	78	404	240,000
AF.10	"	EFFLUENT FROM R.C.A.F. S.T.P. (AYLMER)	460.0	644	80	564	

P O R T S T A N L E Y

K.1	JULY 22/58	WILSON & LODER FISHERIES	272	441	101	340	240,000
K.2	"	MERSNER FISHERIES	7	228	86	202	24,000
K.4	"	AT BRIDGE NORTH END OF PORT STANLEY	10	428	112	316	240
K.5	"	OPPOSITE ANGLICAN CHURCH IN PORT STANLEY	5.2	400	98	302	2,400
K.6	"	OPPOSITE KANGIO YACHT CLUB	6.0	360	38	322	24,000
K.7	"	OPPOSITE HELTY STREET DRAIN	6.8	426	76	350	2,400
K.8	"	DRAIN N.W. OF LIFT BRIDGE	12.0	412	110	302	2,400,000
K.9	"	MOUTH OF KETTLE CREEK (AT MIDDLE LAKE GRAIN ELEVATOR)	3.6	368	96	272	2,400,000
K.10	"	S.E. END OF MAIN DOCK	1.6	232	18	214	24,000
K.11	"	AT LIFT BRIDGE S.E. OF BRIDGE	5.3	370	32	338	24,000
K.12	"	25 YDS BELOW S.E. END OF LIFT BRIDGE	3	372	62	310	2,400,000
KPS.15	"	HWY #4 ACROSS FROM KANGIO YACHT CLUB	200	2344	1696	648	24,000
KPS.16	"	DRAIN FROM GLEN VALLEY AREA	6.0	436	172	264	2,400
KPS.17	"	BRIDGE AT DIVIDING LINE BETWEEN EAST, WEST BEACHES	1.0	276	30	246	240,000
-	"	PORT STANLEY BEACH	1.6	194	24	170	

W E S T L O R N E

WL.21	JULY 23/58	JUST ABOVE WEST LORNE AT EAST LIMITS OF VILLAGES	3.1	408	56	352	240
WL.20	"	JUST BELOW WEST LORNE AT CULVERT - HWY # 76	5.6	606	66	540	24,000

NO SAMPLES TAKEN AT RODNEY

		DUTTON					
D.19	JULY 23/58	CREEK 2 MILES N.W. OF DUTTON (DOWNSTREAM)	36	2250	1490	760	24,000,000 +
D.22	"	AT BRIDGE 1ST SIDE ROAD WEST OF DUTTON (UPSTREAM)	3.3	560	82	478	240
		PORT BURWELL					
PB.1	JULY 24/58	PORT BURWELL DRAIN ON BEACH EAST OF OF OTTER RIVER APPROX. 150 YDS.	3.8	584	28	556	240
PBO.3A	"	AT MOUTH OF OTTER RIVER	6.6	324	26	298	240
PBO.4A	"	PORT BURWELL ABOVE FISHERIES	7.1	372	48	324	240
PBO.4B	"	PORT BURWELL BELOW FISHERIES	8	406	74	332	2,400
		SPRINGFIELD					
SC.8	JULY 24/58	ABOVE SPRINGFIELD	5.6	408	28	380	2,400
SC.9	"	BELOW SPRINGFIELD	5.6	442	82	360	240
		BELMONT					
K.52	JULY 22/58	ABOVE BORDEN CO. DRAIN OUTFALL	4.1	444	58	386	240,000
K.53	"	AT BORDEN CO. DRAIN OUTFALL	16	262	10	252	24,000,000 +
K.54	"	APPROX. 300' BELOW BORDEN CO. DRAIN OUTFALL	5.8	406	60	346	2,400,000
K.55	"	AT BRIDGE SOUTH END OF BELMONT VILLAGE	1.8	456	66	390	24,000,000 +
K.56	"	ABOVE MUNICIPAL DRAIN OUTFALL	0.9	422	44	378	260
K.57	"	BELOW MUNICIPAL DRAIN OUTFALL	2.2	420	16	404	2,400
K.58	"	AT BRIDGE 1 MILE SOUTH WEST OF BELMONT	22	416	20	396	24,000,000 +
		VIENNA					
VO.5	JULY 24/58	ABOVE VIENNA	8.2	374	44	330	240
VO.6	"	BELOW VIENNA	8.2	406	20	386	2,400
		PORT BRUCE					
PBC.13	JULY 24/58	1.5 MILES WEST OF PORT BRUCE	6.8	360	68	292	240,000
PBC.12	"	AT BRIDGE ON HWY #73 NORTH OF PORT BRUCE	5.6	328	22	306	24,000
PBC.11	"	PORT BRUCE AT MOUTH OF CATFISH CREEK	5.0	308	64	244	2,400
-		PORT BRUCE PUBLIC BEACH	35	682	436	246	

MAPLETON CHEESE & BUTTER COMPANY

CT.10	JULY 24/58	ABOVE DRAIN FROM MAPLETON CHEESE FACTORY	4.8	406	114	292	2,400,000
CT.11	"	BELOW DRAIN FROM MAPLETON CHEESE FACTORY	29,000	113,548	112,122	1426	280

UNION

K.13		BELOW UNION AT DAM	5.6	310	34	276	24
K.14		ABOVE UNION AT HIGHWAY	2.6	360	10	350	

WATER RESOURCES SURVEY

- COUNTY OF ELGIN -

CHAPTER 3

The water resources of each municipality are considered separately in the different sections of this report. All aspects of water supply, treatment and pollution are reviewed, and recommendations made with regard to future water development and pollution control. The City of St. Thomas is considered first, followed by the towns, villages and townships. The locations of these are shown in Figure 1. Figure 2 shows the main drainage courses in the county. The locations of sampling stations and the results of the analyses of the samples are shown in Figure 3 and Table 1, respectively.

CITY OF ST. THOMAS

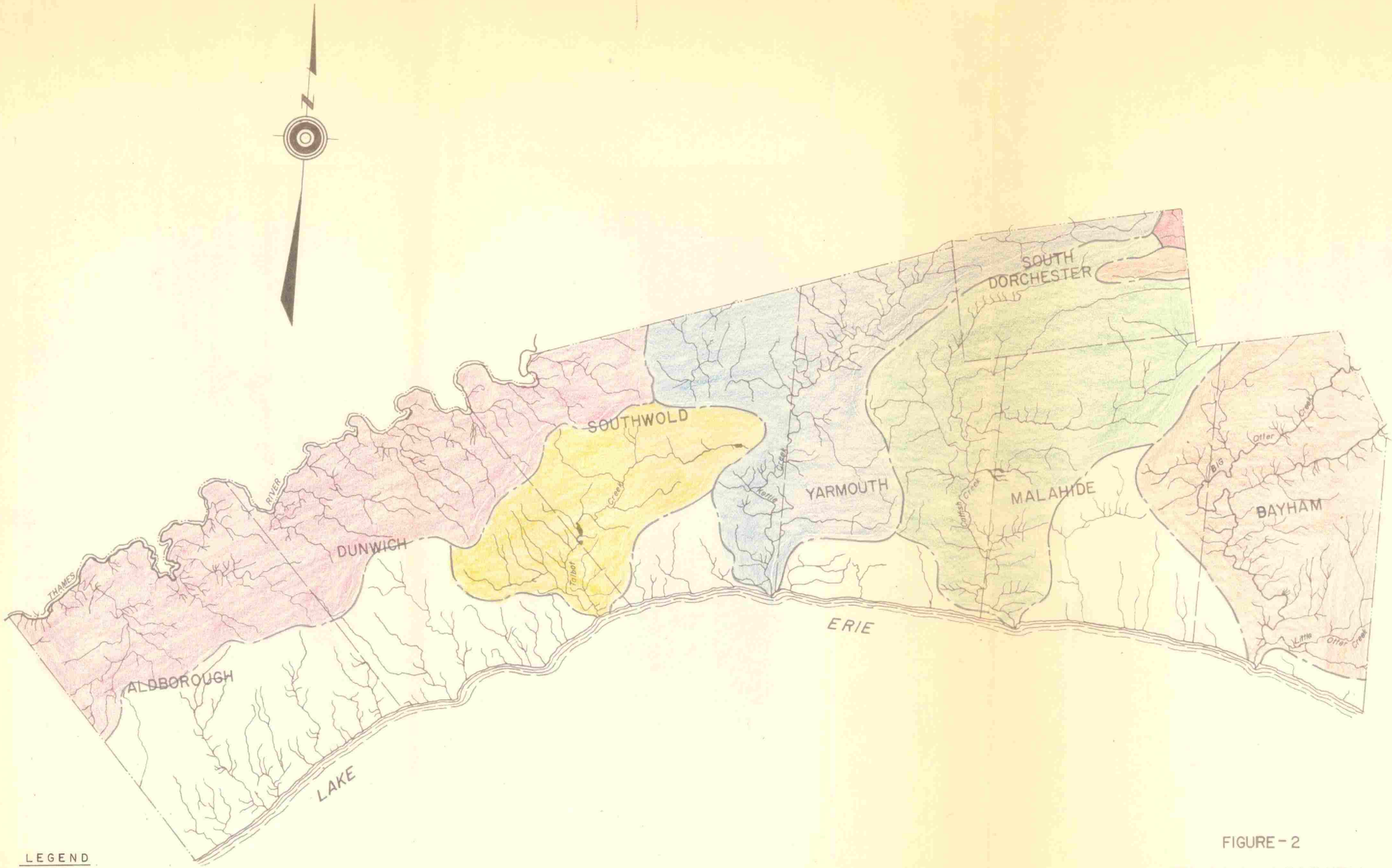
I Water Supply

1. Sources

The present sources of the St. Thomas water supply are Kettle Creek and drilled wells. The main supply is Kettle Creek which has two dams to maintain reservoir storage. Within the reservoir area are a number of drilled wells which are flowing and contributing ground water to the surface storage area. (See Figure 4).

Since the construction of the upper dam in 1921, approximately 50 percent of its original storage capacity has been lost due to the silting up of the reservoir.

Two drilled wells have been developed to augment the river supply. One of these, completed in 1955, is located in the valley of Kettle Creek below the reservoir area. The second



LEGEND

- BIG OTTER CREEK
- CATFISH CREEK
- THAMES RIVER
- KETTLE CREEK
- TALBOT CREEK

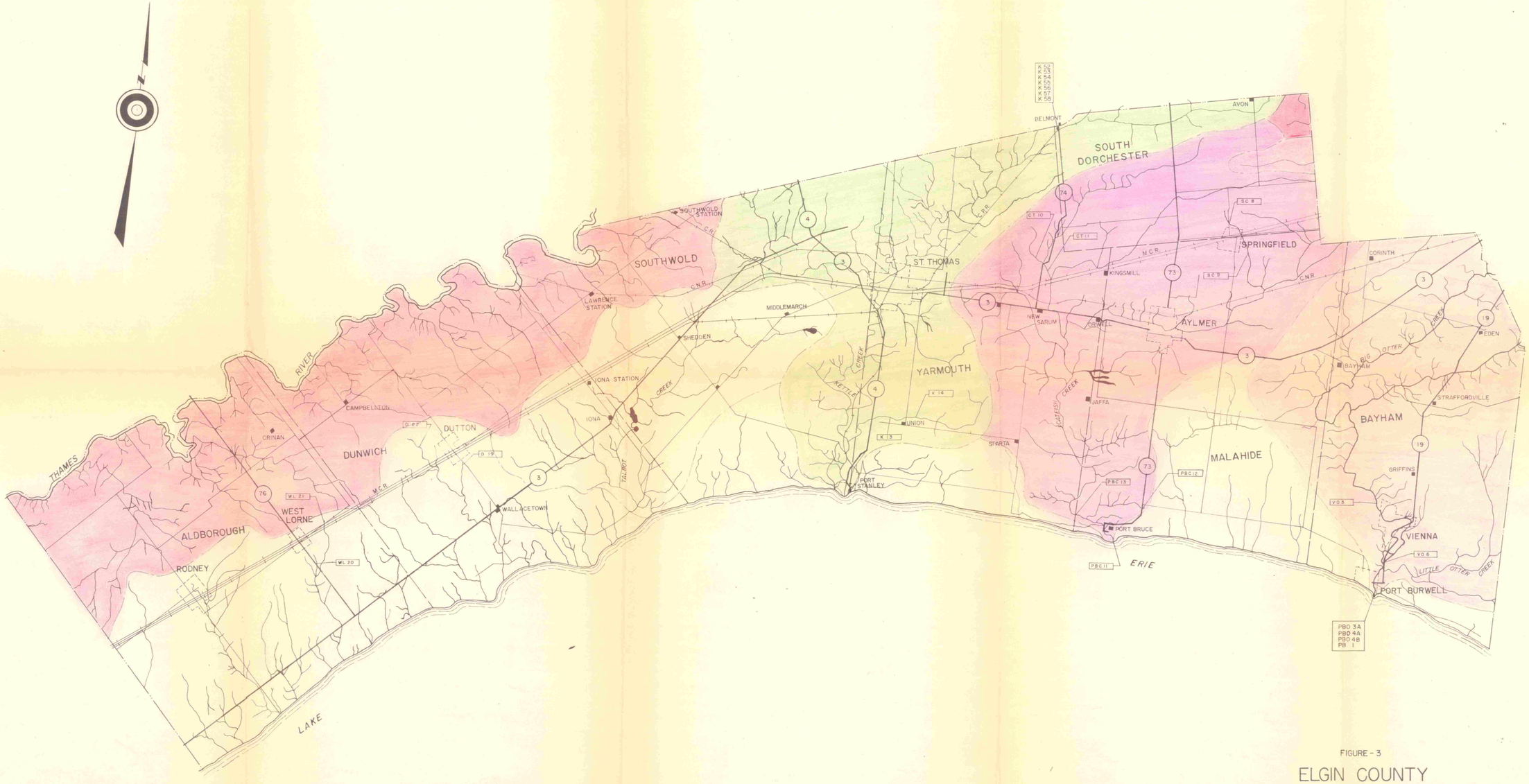
FIGURE - 2

ELGIN COUNTY

DRAINAGE PLAN

SCALE: 1" = 4 MI.

O.W.R.C. AUGUST 1958 H.E.



LEGEND

ABT SAMPLING POINTS

BIG OTTER CREEK
CATFISH CREEK
THAMES RIVER
KETTLE CREEK
TALBOT CREEK

FIGURE - 3

ELGIN COUNTY

STREAM POLLUTION SURVEY

SCALE : 1" = 2 MILES

OWRC TORONTO JAN 1959 H.E.

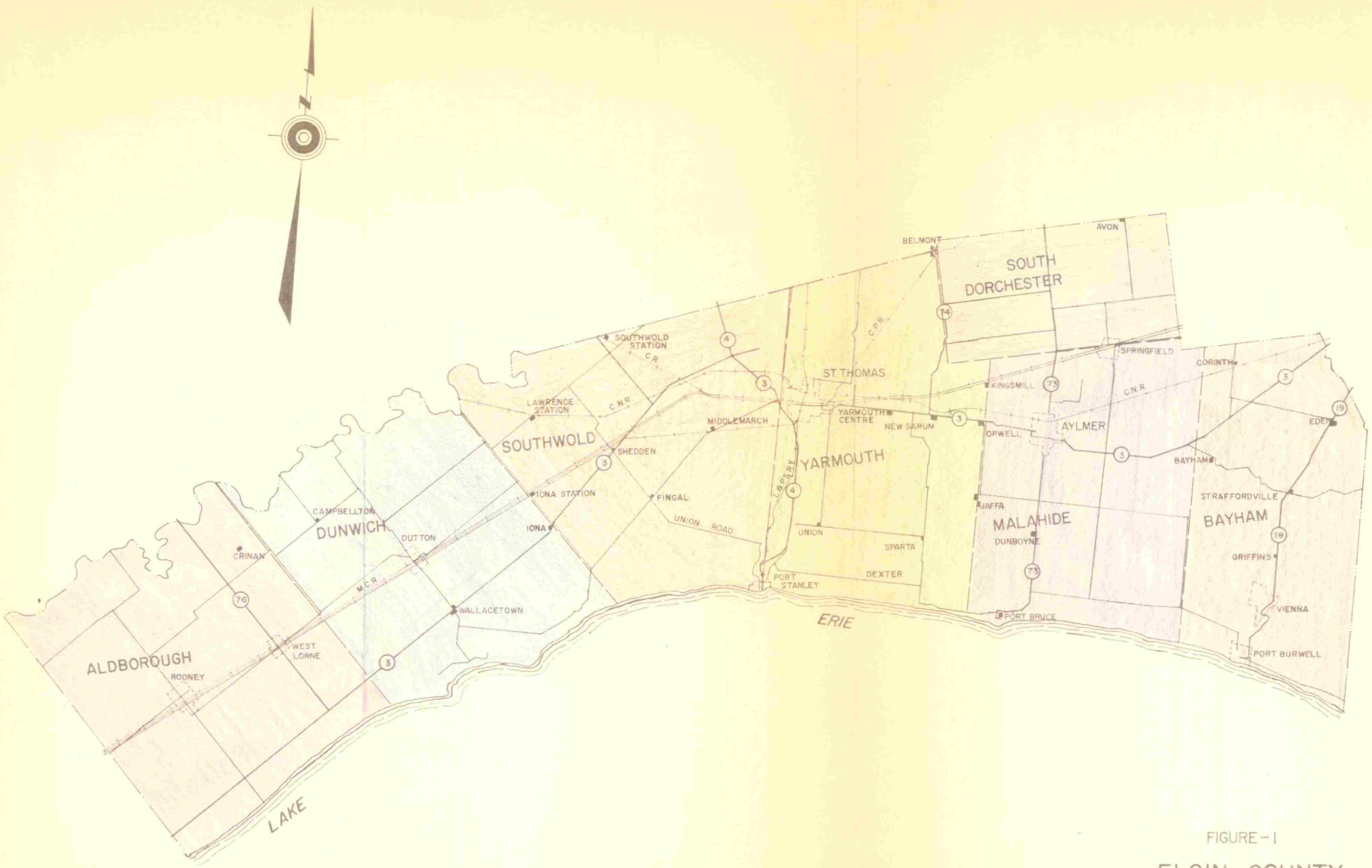


FIGURE – I

ELGIN COUNTY

SHOWING MUNICIPAL BOUNDARIES

SCALE: 1" = 4 MI.

O.W.R.C. AUGUST 1958 H.E.

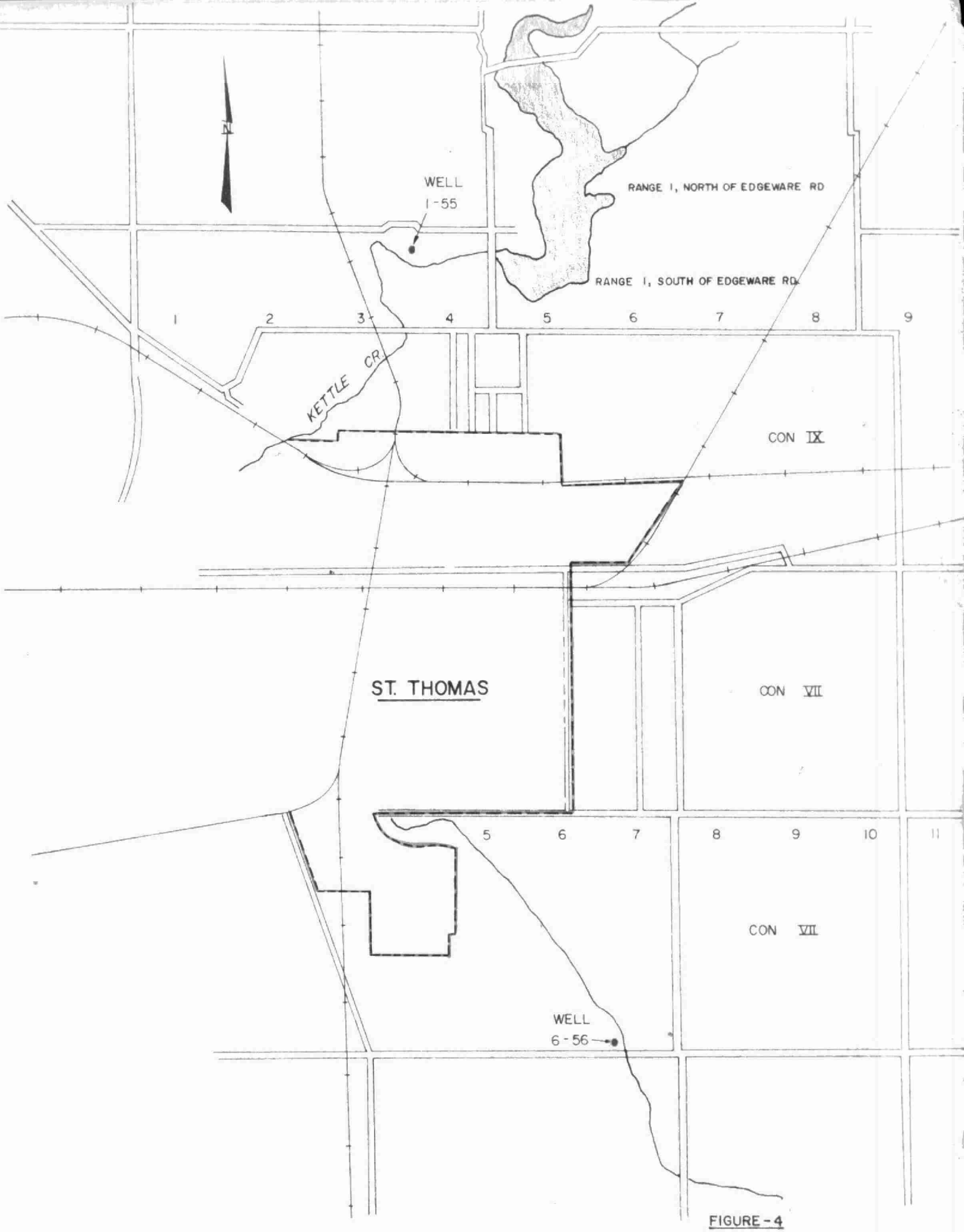


FIGURE-4

CITY OF ST. THOMAS

SHOWING LOCATIONS OF WELLS

SCALE 2" = 1 MILE

OWRC TORONTO JULY 1959 H.E.

well, known as the McKenzie well was drilled in 1956 and after a short period of use has been placed in reserve.

2. Pumpage

The average daily per capita water consumption for 1957 was 87 gallons. There has been a steady increase in pumpage over the years. For example in 1938 and 1957 the average daily pumpages were 1,360,000 gallons and 2,200,000 gallons, respectively. This represents an increase of 62 percent in a 20 year period.

The maximum daily water consumption for 1957 was 2,882,000 gallons. This is an increase of 30 percent over the average. The minimum daily pumpage was 1,651,000 gallons.

3. Treatment

The quality of water in Kettle Creek is variable. There have been intermittent taste and odour complaints along with the problem of high water temperatures during the summer months. There have also been periods of high turbidity. It is believed that the taste and odour problems are due to both natural causes and domestic and industrial wastes.

The natural causes are algal and aquatic growths which grow readily in the river under the existing temperature and nutrient conditions. Wastes are discharged upstream at Belmont. In particular phenolic wastes have created taste problems in the river supply. Heavy growths of algae are regularly cleaned out of the pre-settling pond. In addition, considerable difficulty was experienced in 1956 due to a heavy growth which developed around the sand particles in some of the filters.

The treatment consists of preliminary settling, chlorination, application of ammonium sulphate and activated carbon, aeration, mixing, settling and filtration. The highest rate of alum consumption occurs during the period from October to January when low temperatures result in poor flocculating conditions. The period of high chlorine dosage is during July and August when the organic content of the water is greatest.

The following table lists the amounts of chlorine and alum used in parts per million during 1957.

	Alum	% of Average	Total Chlorine	% of Average
Average	25.5	100%	1.48	100%
Minimum	19.8	78%	0.75	51%
Maximum	31.6	124%	2.33	157%

The pre-settling reservoir is helpful in dealing with the intermittent problem of high turbidity. However, as it is open, it provides an ideal growing area for algae and other aquatic growths. Occasionally the organic material is not controlled and it is carried over to the filters, shortening the filter runs and creating taste and odour problems. This treatment problem will increase with any addition to the pollution of the watershed upstream from the reservoir.

Such growths as algae and slimes are proportional to the amount of nutrient in the water. One of these nutrients is ammonia. The amount of this material in Kettle Creek has been determined at various times and ranges from 0.5 to 5.0 p.p.m. reported as Nitrogen. These figures indicate the wide range in the amount of this nutrient and account in part for the general fluctuation in the quality of the water.

The variation in hardness of the river water has been recorded as ranging from 144 to 296 ppm. and the alkalinity from 100 to 250 ppm.

The inferior quality of, and the frequent changes in, chemical and organic contents of the raw water make it difficult to produce continuously a high standard of water for delivery to the consumers.

4. Distribution

The distribution system consists of 45 miles of cast iron and steel pipe, varying in diameter from 4 inch to 18 inch. At present there are some 6300 services. These are 100 percent metered. Water storage is provided by a 1,200,000 gallon ground reservoir and a 500,000 gallon elevated tank. The system supplies 25,155 persons. Of this number 19,202 live in the City of St. Thomas and the remainder are in the Township of Yarmouth.

5. Potential Additional Supplies

(a) Ground Water

There has been extensive test drilling in the St. Thomas area in search of ground-water supplies during the past 50 years. This has produced only two high capacity wells. Although the water-bearing formations are extensive throughout the St. Thomas area, they are generally not thick and are composed of fine materials. Any future well exploration programme will involve considerable test-drilling and will have to be carried out at greater distances from the city.

Springs to the north of St. Thomas have been developed to augment the flow of Kettle Creek into the reservoir area. There are additional ground-water supplies which could be developed from these springs which flow into Kettle Creek for a distance of several miles north of the city.

(b) Surface Water

Kettle Creek is a possible source of additional water supply. Consideration has been given to enlarging the storage area of this creek. The advantage gained by increasing the supply of water from this source would be offset by increased loss due to evaporation and the gradual silting of the reservoir. In addition, the treatment problems associated with quality of the creek water would still be present.

Kettle Creek is utilized to receive the treated effluents from the sewage disposal plants. A minimum flow is required for dilution of discharges from sewer outfalls. It would seem likely that additional storage would be needed to maintain this desirable minimum flow rather than provide for future water supply for domestic purposes. This will affect the programme of sewage treatment.

Lake Erie, located approximately six miles south of the city limits would appear to be the logical source of additional water supply. This source would provide an unlimited quantity of water readily amenable to

conventional water purification methods. Information on this has been provided to the city by the OWRC.

II Water Requirements of the Future

The water needs of the future will depend to a large extent on the number and types of industries which are attracted to the area. As previously noted the increase in water consumption in the last 20 years has been 62 percent. At present the per capita daily consumption is 87 gallons.

The city population in 1938 was 16,362 and in 1957 it was 19,202. This represents an increase of 17 percent in 20 years. However, a considerable population residing outside the city is supplied with water service. This amounted to almost 6000 people in 1957 or 31 percent of the total population. It is anticipated that a population of from 30,000 to 35,000 people will be supplied with water by the city in twenty years.

St. Thomas is now actively engaged in attracting industry to the area. For this purpose the municipality is planning to provide completely serviced industrial lots in the northeast section of the city. In view of the above, the water consumption for St. Thomas can be expected to at least double in the next twenty years to an estimated 4.5 M.G.D. or more depending on industrial growth.

III Water Pollution

The City of St. Thomas and bordering sections of the townships are served by sanitary and storm sewer systems. Sanitary sewer flows receive treatment in two activated sludge plants with a combined capacity of 3 M.G.D.

The sewage treatment works consist of primary and final settling, aeration and sludge digestion. A study of the records at the plant indicated that there were 33 days between February 7th and June 7th, 1959, when the flow was in excess of the capacity of the plants. In all except eight of those days, the increase could be attributed to rainfall. In addition, the sewage reaching the plant is quite weak in comparison with many industrial cities. The average B.O.D. was approximately 140 p.p.m. It can be stated, therefore, that the plants are approaching their hydraulic capacity, but that the organic loading is relatively light. The plants have the advantage of good operation and under existing conditions can turn out good effluents.

There will be a need for expansion of the St. Thomas sewage disposal plant as the water consumption rises.

Most of the domestic and industrial wastes in St. Thomas are discharged to the municipal sewage treatment plants described above. Some small residential areas bordering Kettle Creek discharge raw or partially treated sewage to this watercourse. These areas are noted on the sampling map and can be summarized as follows: (See Figure 5).

Location	Map Area Number	Sampling Point	Nature of Waste
Hiawatha St.	2	K31	Raw domestic sewage
Jackson St.	3	K31	Raw domestic sewage
St. George St.	4	K33	Septic tank effluent
Talbot St. W., and Townline	5	K40	Raw domestic sewage
Walnut St.	6	K40	Septic tank effluent
First Ave.	8	K23,24, 25 and 26	Septic tank overflows

Plans have been prepared for installing pumping stations which will deliver all sewage from areas Nos. 2, 3 and 4 into the sanitary sewers.

The effluents from the two sewage treatment plants were satisfactory at the time of sampling with the exception of the high coliform counts. Past inspections of these plants have indicated the need for extensive improvements to the old sewage treatment unit.

Industrial Waste

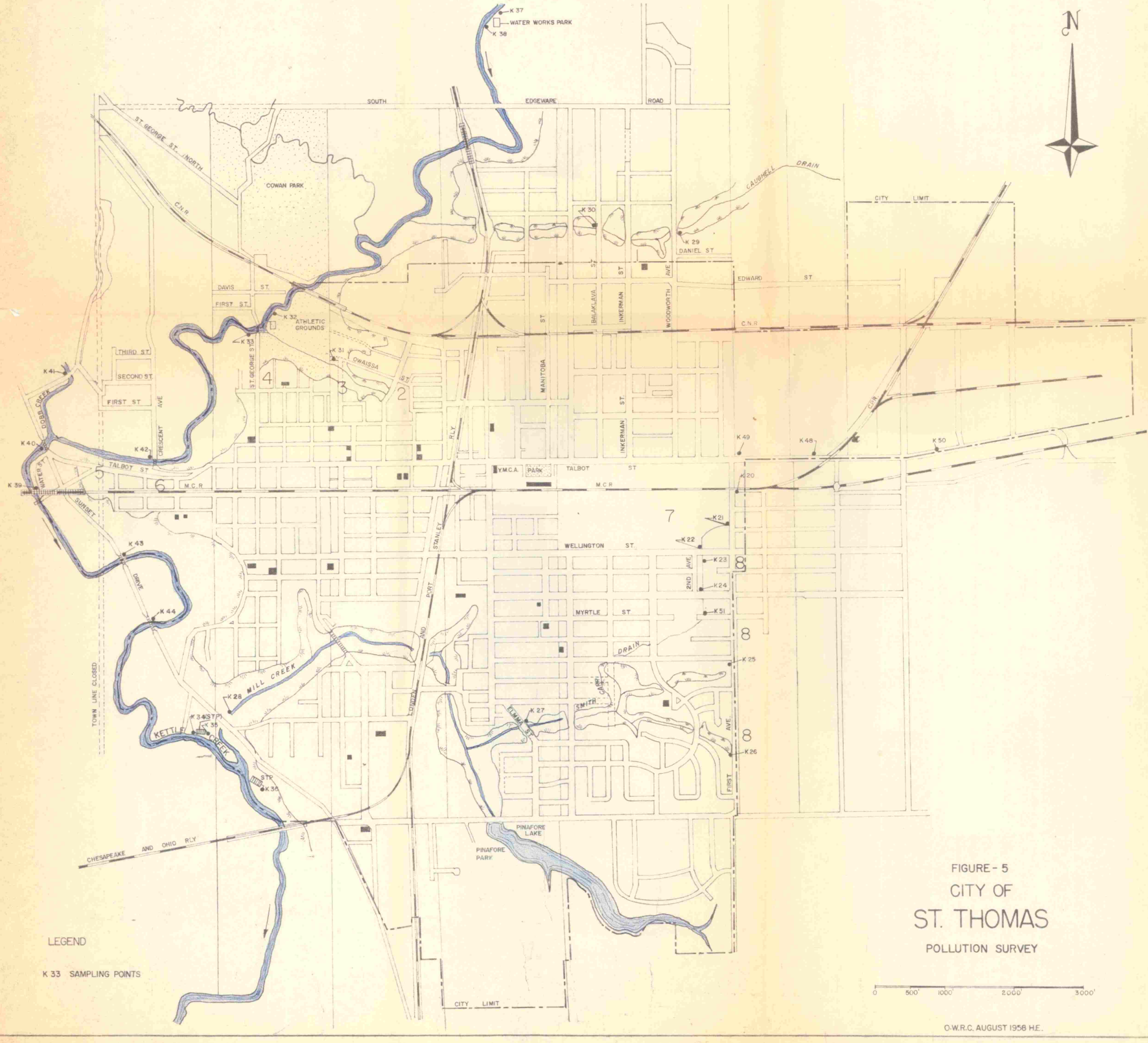
Several industries in St. Thomas were found to be discharging wastes to surface water drains and watercourses.

Weatherhead Company of Canada Ltd.

This plant manufactures screw machine products, hydraulic aircraft hose, precision aircraft fittings and control tube assemblies for the automotive industry. Approximately 250 persons are employed.

The average water consumption is estimated to be 2.3 M.G.D. The waste discharge would be approximately equal to this amount all sanitary wastes are discharged to the municipal sanitary sewers. Industrial wastes result from plating operations and possible oil spillage, and these are discharged to the Inkerman Street storm sewer which flows into the Caughell drain. A sample was obtained at the sewer outfall and the results of the analysis were as follows:

Map Area Number	5 Day B.O.D. (ppm)	Solids (ppm)			pH	Phenol (ppb)	Oil	Chrome	Cyanide
		Total	Susp.	Diss.					
1	7.2	460	22	438	7.3	6	11	2.2	1.9


N
K 37
WATER WORKS PARK
K 38
SOUTH EDGEWARE ROAD
ST. GEORGE ST. NORTH
C.N.R.
COWAN PARK
CAUGHELL DRAIN
CITY LIMIT
K 30
K 29
DANIEL ST
EDWARD ST
DAVIS ST.
FIRST ST.
K 32
ATHLETIC GROUNDS
K 33
K 31
OWAISSA ST.
BALAKLAVA ST
INKERMAN ST
WOODWORTH AVE
MANITOBA ST
C.N.R.
THIRD ST.
SECOND ST
FIRST ST
ST GEORGE ST
CRESCENT AVE
DOBB CREEK
K 41
K 40
K 42
K 49
K 48
K 50
K 20
TALBOT ST
Y.M.C.A. PARK
M.C.R.
WATER ST
K 39
SUNSET DRIVE
K 43
K 44
WELLINGTON ST.
K 21
K 22
K 23
K 24
2ND AVE.
MYRTLE ST
K 51
K 25
K 26
K 27
K 28 MILL CREEK
K 34 (STP)
K 35
KETTLE CREEK
STP
K 36
TOWN LINE CLOSED
PORT STANLEY RLY
LOWER
SMITH CARR DRAIN
ELMA ST
FIRST AVE.
PINAFORE LAKE
PINAFORE PARK
CHESAPEAKE AND OHIO RLY
CITY LIMIT
LEGEND
K 33 SAMPLING POINTS
FIGURE - 5
CITY OF
ST. THOMAS
POLLUTION SURVEY
0 500' 1000' 2000' 3000'
O.W.R.C. AUGUST 1958 H.E.

These results indicate that the company was discharging harmful wastes to the storm sewer and eventually to the Caughell drain.

It was reported that these wastes had been responsible for the loss of water fowl in a Bird Sanctuary located on the Caughell drain.

Samples were also obtained at the Caughell drain above and below the Inkerman Street storm sewer outfall. The sample results were as follows:

Location	5 Day B.O.D. (ppm)	Solids (ppm) Total	Susp.	Diss.	pH	Phenol (ppb)	Oil	Chrome	Cyanide	Coliform M.P.N.
Above sewer outfall	3.8	628	34	594	7.6	4	9	0	0	2,400
At Caughell property	1.8	596	42	554	7.4	9	9	2.4	0	24,000

Canada Scrap Iron

An inspection of the scrap yards revealed that a considerable amount of oily wastes from metal shavings was draining into a watercourse which flows into the Caughell drain. Samples obtained at the property were submitted to the Commission's laboratory for examination with the following results:

Location	5 Day B.O.D. (ppm)	Solids (ppm) Total	Susp.	Diss.	pH	Phenol (ppb)	Oil	Chrome	Cyanide	Coliform M.P.N.
See Above	17	584	28	556	7.3	10	9	-	0	-

A sample obtained from a puddle on the property contained 32 percent oil. It is suggested that drainage from such waste materials be directed to a pit on the property or receive other satisfactory treatment.

New York Central Railway

Waste materials result from the maintenance and servicing of locomotives. Company officials advised that very little maintenance work was being carried out at the present time. The buildings formerly used for the servicing of steam locomotives were being demolished. Some maintenance work is carried out on diesel locomotives, but this does not produce a great volume of waste. It was estimated that the company's water consumption was approximately 468,000 gallons per month. The property is connected to sanitary sewers. A drain which was installed to carry waste water from steam locomotives was sampled. This was carried out following a heavy rainfall and the adverse laboratory results would suggest that oil and other wastes from the property had been washed into the drain. The result of the analysis is as follows:

Location	5 Day B.O.D. (ppm)	Solids (ppm) Total	Susp.	Diss.	pH	Phenol (ppb)	Oil	Chrome	Cyanide	Coliform M.P.N.
See above	50	380	52	328	7.6	5	-	.006	0	-

Timken Bearing Company Ltd.

The company is employed in the manufacture of tapered roller-bearings and rock bits. The plant's water consumption was estimated at 2.5 million gallons per month. Plant wastes, consisting mainly of cooling oil and drainage from metal shavings are discharged through a municipal storm drain to the Smith - Carr open drain. Samples were obtained of the industrial wastes at various locations.

Location	5 Day B.O.D. (ppm)	Solids (ppm) Total	Susp.	Diss.	pH	Phenol (ppb)	Oil	Chrome	Cyan-ide	Coli-form M.P.N.
Manhole at Timken Co.	200	812	168	644	7.6	10	327	-	0	-
At Carr Drain	24	380	108	272	7.4	12	171	-	0	-
At Carr Drain	34	416	48	368	7.4	12	89	-	0	

These analyses indicate that treatment of the plant wastes is required to prevent further pollution of the receiving watercourse.

Clevite Limited

This company manufactures parts for the automotive industry. It was estimated that the plant's water consumption was 3,000,000 gallons per month. Company officials reported that all wastes from the plant were discharged to the municipal sanitary sewer. However, a sample was obtained from a storm drain below the Clevite Ltd. plant with the following analysis:

Location	5 Day B.O.D. (ppm)	Solids (ppm) Total	Susp.	Diss.	pH	Phenol (ppb)	Oil	Chrome	Cyan-ide	Coli-form M.P.N.
See above	2.8	226	10	216	7.4	8	6	-	0	-

The presence of phenol and oil indicates that industrial wastes were being discharged to the drain.

Canadian Allis-Chalmers Limited

Electrical motors are manufactured at this plant. The company's water consumption was estimated at 400,000 gallons per month. Plant wastes are discharged to the municipal sanitary sewers. Oil odours were detected in the storm sewers near the plant and this was believed to be due to drainage from barrels

of iron filings. Company officials are taking steps to eliminate this problem and no further trouble is anticipated. A sample obtained at a storm drain manhole below the company plant was analyzed as follows:

Location	5 Day B.O.D. (ppm)	Solids (ppm) Total	Susp.	Diss.	pH	Phenol (ppb)	Oil	Chrome	Cyanide	Coliform M.P.N.
See above	1	236	12	224	7.4	8	184	-	0	-

These results indicate that considerable oil was present in the storm drain.

Canadian Clark Limited

The plant is employed in the assembling of heavy machinery. Approximately 240,000 gallons per month of water is used. Plant wastes are discharged to the municipal sanitary sewers; however, it was indicated that some wastes from the spray-paint booths might overflow to the storm sewers. A sample was obtained at a storm sewer manhole below the company plant. The analysis was as follows:

Location	B.O.D. (ppm)	Solids (ppm) Total	Susp.	Diss.	pH	Phenol (ppb)	Oil	Chrome	Cyanide	Coliform M.P.N.
See above	244	546	140	406	6.0	12	2	-	0	-

The high B.O.D. indicates a strong waste.

Jaeger Machine Company of Canada

The volume of water used by the company was estimated at 250,000 gallons per month. Plant wastes, consisting of sanitary sewage and possibly some overflow from the paint-spraying operations, are discharged to the municipal sanitary sewer.

Chesapeake and Ohio Railway

Wastes resulting from the washing and general servicing of diesel engines are discharged through a company drain to Mill Creek. Before final discharge to the watercourse the wastes flow through a circular catch basin located at the creek. A sample of the effluent was submitted to the Commission laboratory for examination. The analysis of the sample was reported as follows:

Location	5 Day B.O.D. (ppm)	Solids (ppm) Total	Susp.	Diss.	pH	Phenol (ppb)	Oil	Cyanide	Coliform M.P.N.
See above	32	530	30	500	7.1	20	6	0	-

A considerable amount of oil wastes had accumulated at Mill Creek in the vicinity of the railway company's drain. The above laboratory results do not indicate that oil was present in large volume. It is possible that this sample was not representative in view of the general condition of Mill Creek at the drain outfall.

Surface Water Drains

Other industries investigated in St. Thomas did not appear to have industrial waste problems at the time of the survey. A number of surface water drains were sampled and as indicated by the following laboratory analyses were found to contain both domestic and industrial wastes.

Location	Sample Number	5 Day B.O.D. (ppm)	Solids (ppm) Total	Susp.	Diss.	pH	Phenol (ppb)	Oil	Cyanide	Coliform M.P.N.
Wellington St. outlet	K23	36	584	44	540	7.4	-	-	-	24,000,000+
Dougherty St. outlet	K24	3.2	614	30	584					2,400,000+
Rear of St. Thomas Bronze Co.	K46	1.6	442	44	398	7.7	3	9	0	-
Drain outfall at First Ave. south of Talbot St.	K47	34	416	48	368	7.4	12	8.9	0	-
Storm drain east of Timken Co.	K48	1	392	8	384	7.1	6	27	0.6	
Drain outfall at First Ave. north of Talbot St.	K49	21	772	32	740	7.2	5	6.5	0	-
Manhole Yarmouth and Clark Streets	K50	42	380	52	328	7.7	13	0	0	-

The above results indicate that some domestic waste from the Township of Yarmouth was entering Mill Creek. It was reported by city officials that the cleaning of township storm sewers in this area revealed the presence of domestic sewage.

IV Recommendations for Water Development

In the planning of water supply for St. Thomas, it is logical to choose Lake Erie as the source.

Ground water supplies in the immediate area of the city are not plentiful. It may be possible to develop additional wells, but these will have to be at greater distances from the distribution

system. The springs that flow into Kettle Creek a few miles north of the city are also capable of yielding limited amounts of good quality water. It is likely that the cost of exploration for and development of ground water to meet the increasing needs of St. Thomas would reach the point where another source of water should be considered.

Increased storage of water on the Kettle Creek watershed adjacent to the city would make available additional amounts of surface water. Considering the quality of this water and the need for maintaining a minimum flow below reservoir areas for purposes of sewage dilution this source has limited value.

The limitations in the development and use of ground water and of Kettle Creek indicated above point to the need for a more adequate source of supply for the future demands of the city. Lake Erie should be regarded as the nearest reliable source of uniform quality water for the city. It is therefore recommended that steps be taken to develop Lake Erie water as a source of supply for St. Thomas.

V Recommendations for Pollution Control

The results of the pollution survey have indicated that raw and partially treated sewage and industrial wastes are being discharged into Kettle Creek. The sewage treatment plants are providing good treatment, but the expansion of the sewer system into township areas will necessitate the enlargement of the existing facilities.

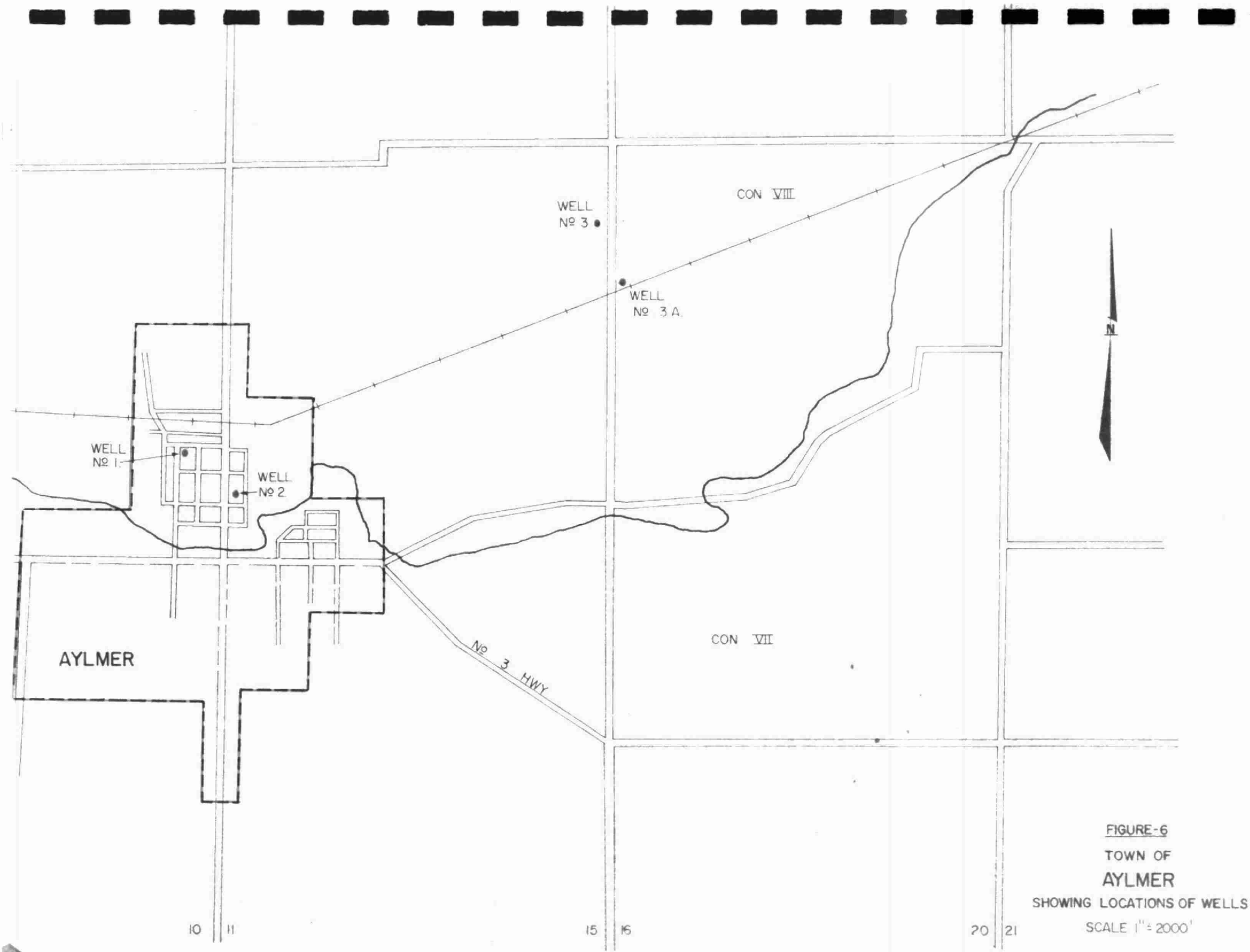


FIGURE-6

TOWN OF

AYLMER

SHOWING LOCATIONS OF WELLS

SCALE 1" = 2000'

OWRC TORONTO JULY 1959 H.E.

It is recommended that the abatement of pollution in Kettle Creek be brought about through the treatment of industrial wastes by the offending industries and that the industrial and residential areas outside the city be included where possible in the sewer system for treatment at the existing sewage treatment works.

WATER RESOURCES SURVEY

- COUNTY OF ELGIN -

CHAPTER 4

AYLMER

I Water Supply

1. Source

The Town of Aylmer obtains its water supply from four drilled wells. (See Figure 6). One of these, known as the No.1 well is kept as a standby unit.

The No. 2 well, located within the municipal boundaries, was completed to a depth of 165 feet in 1931. The aquifer is fine sand and gravel. The static level has lowered from 29 feet in 1930 to 55 feet in 1958. A pumping test on the well indicated a capacity of approximately 250 g.p.m.

The No. 3 well is located one mile northeast of the town. It was completed to a depth of 84 feet in 1939. The static level lowered from 14 feet to 23 feet since the well has been put into use. The well has been test-pumped at 400 g.p.m.

A fourth well, known as 3A was drilled to a depth of 126 feet in 1949 near the No.3 well. The static level has varied from 30 feet in 1949 to 36 feet in 1958. The well has a capacity of 500 g.p.m. and its yield is sustained by nearby artificial recharge operations. This well is used as the main source of water by the town and together with the No.3 well supplies about 500 g.p.m.

Concerned at the steady decrease in water levels in the municipal wells, the Town of Aylmer initiated an artificial recharge programme in 1955 to replenish ground water supplies.

A well was dug to the top of the aquifer a short distance to the north of the No. 3 well into which a surface drain was connected. When the quality of water in the No. 3A well was affected by this operation, this project was abanconed and the drain re-directed into a large pit which was excavated several hundred yards farther to the east. The bottom of the pit penetrated the upper sands and gravels of the water bearing strata. The artificial recharge to the aquifer resulting from this operation had an almost immediate beneficial effect on the ground water levels of the area.

2. Pumpage

The average consumption of water in the town is about 600,000 g.p.d. The maximum pumpage occurs during the canning season with a consumption of approximately 1 M.G.D. The recorded maximum consumption was 1.25 M.G.D.

3. Treatment

Wells Nos. 2 and 3 pump directly to the distribution system without treatment. Chlorination has been provided for the No. 3A well following adverse bacteriological samples following the recharge operations.

4. Distribution

The system consists of 18.2 miles of 4 to 10 inch mains. The storage capacity of the distribution system consists of a 50,000 gallon elevated tank at Myrtle and Forest Streets and a 125,000 gallon standpipe located on the Public Utilities property.

5. Potential Additional Supplies

Extensive test drilling in the Aylmer area, particularly to the northeast of the recharge site has indicated additional

supplies of ground water are available. It may be necessary, however, to locate a well in this area at a considerable distance from the town in order to avoid serious interference with the existing wells.

Available well data suggest that it may be possible to obtain other large capacity wells elsewhere in the Aylmer area, but an extensive test-drilling programme would likely be necessary to determine how much additional ground water would be procurable.

Surface waters in the vicinity of Aylmer are of such doubtful quality and quantity as to suggest that other sources of supply should be considered. At this stage in the planning of water supply for the town, the Lake Erie source would appear to be uneconomical.

II Water Requirements of the Future

The population in 1957 was 4411, a 33 percent increase in the previous ten year period. This was attributed to an industrial expansion and the municipal airport. If this rate of increase were to continue for the next 10 years, 800,000 g.p.d. would be needed to meet the average demand.

III Water Pollution

Sewage treatment is provided by septic tank and field tile systems. These serve residential and commercial buildings. The installation of private sewage disposal units is supervised by officials of the Elgin-St. Thomas Health Unit. However, some of the older systems are believed to be connected to surface water drains. Samples obtained from Catfish and Bradley Creeks in the

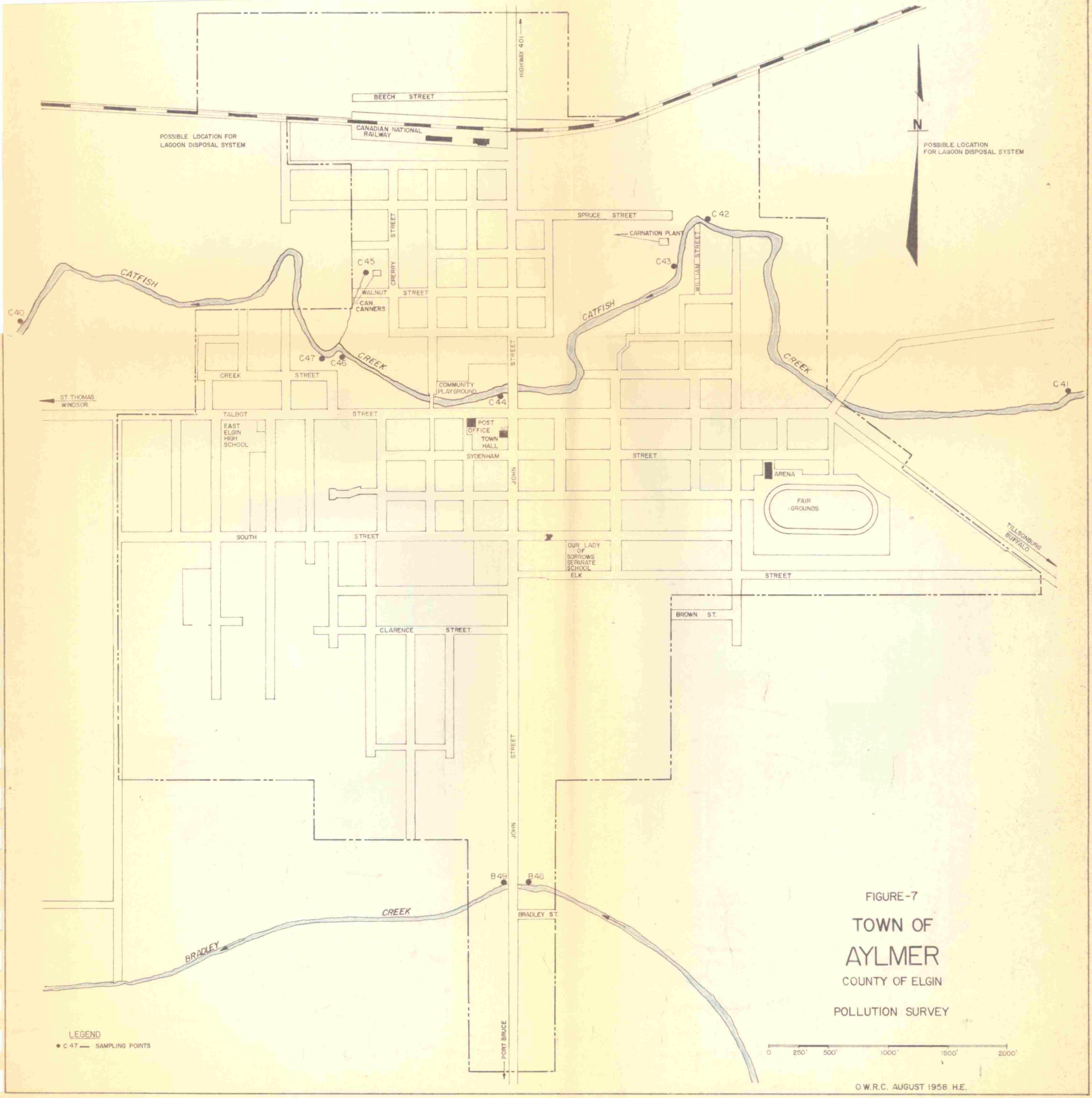


FIGURE-7

TOWN OF AYLMER

COUNTY OF ELGIN

POLLUTION SURVEY

O.W.R.C. AUGUST 1958 H.E.

the survey were analyzed as follows:

Location	Sample Number	5 Day B.O.D. (ppm)	Solids (ppm) Total	Susp.	Diss.	pH	Phenol (ppb)	Coliform M.P.N.
Plant outfall	C45	1,016	1652	220	1432	-	-	2,400

These results reveal that the canning factory was contributing to the gross pollution of Catfish Creek.

Carnation Milk Company, Limited

The company does not provide adequate treatment of the milk wastes, as indicated by the following laboratory examination:

Location	Sample Number	5 Day B.O.D. (ppm)	Solids (ppm) Total	Susp.	Diss.	pH	Phenol (ppb)	Coliform M.P.N.
Plant effluent	42A	460	634	204	430	-	-	-

The pollution of Catfish Creek in the vicinity of Aylmer is serious. This condition is particularly offensive during the canning season.

A programme of pollution control has been undertaken by the municipality. The correction of this pollution will be effected by the construction of sewage works to serve the town and by the treatment of industrial wastes by the industries concerned. Rigid control will be needed over connections to storm drains and private outfalls.

IV Recommendations for Water Development

A programme of test-drilling should be undertaken to provide an adequate water reserve for the town. The proximity of the town to Lake Erie assures the municipality of an adequate source of water should ground-water supplies prove inadequate.

V Recommendations for Pollution Control

Due to the serious pollution of Catfish Creek in the vicinity of Aylmer it is recommended that a municipal sewage works programme be undertaken to include the treatment of all sanitary flows and industrial waste effluents where possible.

Consideration should be given to include the Canadian Canners plant and the Carnation Milk Company in the scheme. In the event that the wastes from these plants cannot be included in a municipal programme it will be necessary for these companies to provide complete treatment of the wastes.

WATER RESOURCES SURVEY

- COUNTY of ELGIN -

CHAPTER 5

- VILLAGES -

Dutton, Rodney and West Lorne

The West Lorne water-works system also supplies the villages of Dutton and Rodney. The three municipalities will be considered together for the purposes of this report.

I Water Supply

1. Source

The water is taken from Lake Erie near Eagle and flows by gravity through a 12 inch diameter pipe to a low lift well. The intake pipe extends 1200 feet into the lake and terminates in 17 feet of water. The low lift pump well is 10 feet square and has a depth of 20 feet.

2. Pumpage

Lake water is pumped to West Lorne, Dutton and Rodney through the hamlet of Eagle which is served en route. Rodney and Dutton are metered at the boundary of West Lorne. Consumers from the lake to West Lorne are included in the West Lorne system.

Water consumption figures in gallons are listed below:

For Year 1957

	Total	Rodney	Dutton	West Lorne
Mar. 31	17;233;900	5;400;000	4;298;000	7;535;900
June 30	17;846;700	7;442;000	5;662;000	4;742;700
Sept. 30	19;870;400	7;968;000	5;114;000	6;788;400
Dec. 31	18,474,700	6,910,000	4,125,000	7,439,700

The total average daily pumpage for 1948 was 358,104 gallons.

The total average daily pumpage for 1957 was 202,186 gallons.

The total maximum daily pumpage for 1949 was 613,600 gallons.

The total maximum daily pumpage for 1957 was 297,000 gallons.

The decrease in pumpage was due to the closing of a canning factory and the fact that the New York Central Railway changed to diesel power. The railway had previously used 3 to 4 million gallons of water a month.

3. Treatment

After alum treatment the water passes through four spiral flow mixing chambers, a settling tank and three rapid sand filters, to a clear water reservoir. Chlorine is injected into the suction line of each high lift pump which delivers the water from the clear well into the distribution system.

Periodically adverse samples are found in the distribution system. There is no apparent reason in the operation of the filter plant for adverse water samples. The records indicated that the chlorination and treatment of the water were

satisfactory. Possibly these adverse samples might be caused by cross connections between the municipal water supply and that of an industry or some private property.

4. Distribution

In West Lorne, Rodney, Dutton and Eagle the distribution system consists of the following: cast iron mains, 30 miles; steel mains, 6 miles; asbestos cement pipe, ½ mile, 3 and 4 inch diameter; 6.34 miles of 6-inch cast iron main comprises the feeder mains from West Lorne to Rodney and serves farmers en route. Domestic services, 860; industrial, 20; commercial, 140; farm, 51. There are 51 hydrants and 200 meters.

Domestic pressure ranges from 35 to 58 lbs., and fire pressure is 85 lbs.

There are two elevated tanks in West Lorne with a total capacity of 65,000 gallons. Rodney and Dutton both have stand pipes, each with a capacity of 180,000 gallons.

5. Potential Additional Supplies

A plentiful supply of water is available from lake Erie to meet the future requirements of these villages.

II Water Requirements of the Future

The populations of the three municipalities are listed below:

	1948	1957	% Increase in 10 years
Dutton	825	801	0
Rodney	859	1017	18
West Lorne	960	1078	12

If there should be a 20 percent increase in popula-

tion over the next 10 year period the average daily consumption of these three villages would be approximately 250,000 g.p.d.

It is suggested that other areas to the north, east and west of the system be supplied with water. Next year, construction of Highway No. 401, 1½ miles north of West Lorne is anticipated. The present water main is one mile away from the proposed highway location. There is some need for water now, and there will be greater need later in the area north of the proposed highway. Therefore, it is desirable that the water main be laid north of the proposed highway before its construction. This will eliminate expensive tunneling costs at a future date.

At present Eagle is served by a 2 inch distribution main from the 10 inch main to West Lorne. This should be replaced by at least a 6 inch main. In addition, consideration could be given to extending this main to New Glascow and then to Rodney. This would form a grid system connecting Eagle, New Glascow, Rodney and West Lorne. Rural areas could be served en route.

A similar arrangement could be considered for Wallacetown. By extending a main to Wallacetown, a grid system would be established connecting Eagle, Dutton, West Lorne and Wallacetown.

The purification plant can filter 842,000 g.p.d. However, the limiting factor in this treatment plant is the total capacity of the high lift pumps which is 576,000 g.p.d. The future needs of this area can be supplied by the addition of more pumps when required.

III Water Pollution

The installation of private sewage disposal systems is supervised by county health officials. It was reported that some of the systems installed prior to the introduction of inspection services, are connected to surface water drains. Laboratory analyses have revealed the presence of pollution in watercourses at Dutton and West Lorne.

The analyses:

Location	Sample No.	5 Day B.O.D. (p.p.m.)	Solids (p.p.m.) Total	Susp.	Diss.	Coliform M.P.N.
Dutton						
1st side road south of village	D.19	3	560	82	478	240
2 miles N.W. of village	D.22	36	2250	1490	760	24,000,000
West Lorne						
East limits of village	WL21	3	408	56	352	240
Below village at Hwy. #76	WL20	5.6	606	66	540	24,000

IV Recommendations for Water Development

It is recommended that future requirements for water in the three municipalities and the adjacent areas described above be met through the expansion of the existing water works system.

V Recommendations for Pollution Control

It is recommended that continued supervision be given to private septic tank systems in order to control pollution in the streams and surface water drains.

Port Burwell

I Water Supply

1. Source

The Village of Port Burwell has no municipal water works system. Water for domestic purposes is obtained mostly from shallow dug wells and a few drilled wells. Some water is also trucked in from other localities.

Dug wells obtain only limited quantities of water from a surface sand layer 10 to 15 feet in thickness. Drilled wells in the area have been generally inadequate, often yielding poor quality water.

2. Potential Additional Supplies

(a) Ground Water

Geological information obtained from well logs and from examination of the high shore cliffs gives little indication that suitable ground water supplies are available in the area. The overburden is approximately 300 feet thick and appears to consist almost entirely of blue clay with minor amounts of sand. Rock wells to the north of the area contain water with a high degree of hydrogen sulphide. Some ground water may be available in a thick mantle of beach sands adjoining Lake Erie.

(b) Surface Water

The Village of Port Burwell is located on Lake Erie at the mouth of Otter Creek. Lake Erie would appear to be the logical source of water for a municipal system. However, due to the cost involved for intake works, consideration should be given to Otter Creek as a source of supply.

II Water Requirements of the Future

Port Burwell has a permanent population of 711 which has increased very slightly over the years. As it is a resort

area, the population greatly increases in the summer months. Oil storage tanks, a coal dock and some fishing are the chief industries. In general, an adequate supply of water is lacking in the village. With this permanent population and the summer population it is quite evident that the village is in need of a municipal water works system.

III Water Pollution

The domestic wastes in the village are discharged to private disposal systems. Installation of private systems is supervised by officials of the Elgin St. Thomas Health Unit. It was reported that there were connections from a number of private premises to surface water drains which discharge into Otter Creek and Lake Erie.

Analyses of samples obtained in the area were reported as follows:

Location	Sample Number	5 Day B.O.D. (ppm)	Solids (ppm)			Coliform M.P.N.
			Total	Susp.	Diss.	
At mouth of Otter Creek	PB03A	6.6	324	26	298	240
Above fisheries	PB04A	7.1	372	48	324	240
Below fisheries	PB04B	8.0	406	74	332	2,400
Municipal drain	PB1	3.8	584	28	556	240

These results are indicative of pollution in the Port Burwell area.

IV Recommendations for Water Development

It is recommended that a municipal water works system be installed with Lake Erie as the source of water supply.

V Recommendation for Pollution Control

The private sewage disposal units installed prior to the introduction of an inspection service in the county should be investigated. Many of these systems are reported to be connected to surface water drains and in this way, contribute to the pollution of Otter Creek.

Port Stanley

I Water Supply

1. Source

Water is obtained from Lake Erie through a 12 inch diameter intake 2090 feet in length which terminates in 17 feet of water.

2. Pumpage

The plant pumps approximately 8000 g.p.d. of untreated water to the R.C.A.F. Station at Fingal.

The maximum daily consumption in 1957 in Port Stanley was 305,000 gallons.

The average daily consumption was 160,000 gallons.

The pumpage per day averages 125,000 gallons, in the winter months.

3. Treatment

Treatment consists of the addition of alum in spiral flow type mixing chambers, sedimentation basins, chlorination and pressure filters.

4. Distribution

The distribution system consists of mains ranging in size from 4 to 8 inches in diameter. There are approximately

1100 services on a flat rate. Domestic pressure is 70 lbs. Elevated storage consists of two tanks with capacities of 87,000 gallons and 62,500 gallons.

5. Potential Additional Supplies

A plentiful supply of water is available from Lake Erie to meet future requirements.

II Water Requirements of the Future

The population of Port Stanley was increased from 996 in 1948 to 1385 in 1957. This represents a 39 percent increase in the previous ten year period. If this trend were to continue in the next ten years the average water consumption would be an estimated 225,000 g.p.d.

The limiting factor in the treatment plant is the capacity of the high lift pumps which is 720,000 g.p.d. The plant is capable, therefore, of supplying the needs of the community for some time.

III Water Pollution

The treatment of domestic wastes in the village is carried out by means of private septic tank and field tile disposal systems. A sanitary survey of the village revealed that some of the premises were discharging sewage wastes to storm sewers. Sampling of Kettle Creek throughout the village revealed the presence of pollution, particularly in the vicinity of the municipal storm sewer outlets.

The analyses of samples were as follows:

Location	Sample No.	5 Day B.O.D. (p.p.m.)	Solids (p.p.m.) Total	Susp.	Diss.	Coliform M.P.N.
Bridge, N. end of village	K4	10	428	112	316	240
Opposite Anglican Church	K5	5.2	400	98	302	2,400
Opposite Yacht Club	K6	6.0	360	38	322	24,000
Opposite Hetty St. drain	K7	6.8	426	76	350	2,400
N.W. lift bridge	K8	12.0	412	110	302	2,400,000
At Middle Lake grain elevator	K9	3.6	368	96	272	2,400,000
S.W. end of main dock	K10	1.6	232	18	214	24,000
S.E. of lift bridge	K11	5.3	370	32	338	24,000
25 yds. S.E. end of lift bridge	K12	3.0	372	62	310	2,400,000
At. Hwy, 4, opposite yacht club	KPS15	200	2344	1696	648	24,000
Drain from Glen valley	KPS16	6.0	436	172	264	2,400
Bridge between E. and W. beaches	KPS17	1.0	276	30	246	240,000
Storm drain	KPS18	1.7	174	6	168	2,400

An investigation was carried out of the method of waste disposal at the three local fisheries. The following samples were obtained at the plant outfalls:

Location	Sample No.	5 Day B.O.D.(p.p.m.)	Solids (p.p.m.) Total	Susp.	Diss.	Coliform M.P.N.
Wilson and Loder Co.	K1	272	441	101	340	240;000
Misner Co.	K2	7	228	86	202	24,000

The G. Verry and Company Fisheries was not in operation during the time of inspection and as a result no samples were obtained.

IV Recommendations for Water Development

It is recommended that the existing water treatment plant and distribution system be enlarged when required to meet future demands.

V Recommendations for Pollution Control

It was established that domestic wastes were being discharged through the municipal storm sewers to Kettle Creek. These connections should be eliminated. Improved treatment of waste is also required at the local fisheries.

It is recommended that consideration be given to a municipal sewage works programme to provide for the collection and treatment of domestic and industrial waste before it is discharged into Lake Erie.

SPRINGFIELD

I Water Supply

1. Source

The Village of Springfield has no municipal water system. Water is obtained from privately owned dug and drilled wells, the majority of which are drilled.

Overburden wells average approximately 100 feet in depth, whereas the rock wells usually exceed 200 feet in depth. The rock wells generally contain hydrogen sulphide in the water. The capacities of the wells are usually adequate.

2. Potential Additional Supplies

The supply of water from overburden wells in the area appears to be sufficient for the needs of the village. It is likely that additional wells could be obtained when necessary.

II Water Requirements of the Future

The population in 1957 was 519, an increase of only 7 percent in the previous ten year period.

The poor quality of water in some of the rock wells has created a problem and as a result there is some local interest in the development of a municipal water works system.

III Water Pollution

Individual sewage systems serve each residence. These units consist of septic tank and field tiles installed under the supervision of the local health authorities. It was reported that some of the older systems were connected to the municipal surface water drains. Samples obtained from Catfish Creek in the vicinity of the municipality indicated the presence of pollution.

The laboratory analyses of these samples were as follows:

Location	Sample No.	5 Day B.O.D. (p.p.m.)	Solids (p.p.m.) Total	Susp.	Diss.	Coliform M.P.N.
Catfish Creek						
Above Springfield	SC8	5.6	408	28	380	2,400
Below Springfield	SC9	5.6	442	82	360	2,400

IV Recommendations for Water Development

It is recommended that consideration be given to the development of a municipal water works system utilizing wells as a source of supply.

V Recommendations for Pollution Control

It is recommended that continued supervision be exercised over private sewage disposal systems to eliminate the discharge of sanitary wastes to Catfish Creek.

VIENNA

I Water Supply

1. Source

Water is obtained from privately owned dug and drilled wells. The majority of the wells are dug varying in depth from 10 to 20 feet. These often go dry in the summer months at which times it is necessary to haul water to replenish the supply.

A few deep wells have been drilled in the village which have obtained varying amounts of hydrogen sulphide in the shale and limestone bedrock.

2. Potential Additional Supplies

Ground water conditions in the vicinity of Vienna

are poor as a result of the predominantly clay overburden and poor quality water in the bedrock.

The only other source of water available to the village is Otter Creek which might be considered as a source for a municipal water works system.

II Water Requirements of the Future

The population of the Village of Vienna in 1957 was 377. This represents an increase of 29 percent in a ten year period. A municipality of this size with the above rate of growth would require a supply of an estimated 40,000 g.p.d. to meet its average needs.

III Water Pollution

Domestic wastes are treated by means of septic tank and field tile disposal systems, which were installed under the supervision of the Elgin-St. Thomas Health Unit. However, some septic tanks were reported to be discharging into municipal surface water drains which in turn discharge into Otter Creek. Laboratory analyses of samples obtained in the Vienna area indicated the presence of pollution.

The results of the analyses were as follows:

Location	Sample No.	5 Day B.O.D. (p.p.m.)	Solids (p.p.m.) Total	Susp.	Diss.	Coliform M.P.N.
Otter Creek						
Above Vienna	V05	8.2	374	44	330	240
Below Vienna	V06	8.2	406	20	386	2,400

IV Recommendations for Water Development

It is recommended that consideration be given to the development of a municipal water works system. Studies should be made on the flow and quality of Otter Creek with the view to utilizing it as a source of supply for the village.

V Recommendation for Pollution Control

Continued supervision should be given to septic tank and field tile disposal systems employed for sewage treatment.

WATER RESOURCES SURVEY
- COUNTY of ELGIN
CHAPTER 6
- TOWNSHIPS -

I Water Supply

The rural township areas including almost all the hamlets obtain their water supplies from dug or drilled wells. In a few areas spring supplies are used and in some of the sand plain portions of the county drive points have been used to obtain water.

In many areas the dug wells have not provided a dependable supply of water. Shortages are frequent during summer periods. Two of the few exceptions to this are the dug wells at New Sarum and Iona. Drilled wells generally provide the dependable supplies of water in the township areas. The depths may exceed 300 feet, with the better quality water being obtained in the overburden. Rock wells usually contain an objectionable amount of hydrogen sulphide.

Some poor water areas occur in all of the townships but particularly in the vicinity of Wallacetown, the south half of Bayham Township and portions of Southwold Township. Good well supplies are reported in most townships particularly in the vicinity of the communities of Eden, Fingal, Orwell, Shedden, Straffordville and Union along with South Dorchester Township and the northern portions of Bayham and Malahide Townships.

The Police Village of Belmont has a municipal water system which was placed in operation in 1957. The source of water is a drilled well, 120 feet deep, with a capacity of 200 g.p.m. A 56,000 gallon capacity reservoir is connected to the system. A local milk processing plant is supplied with 40,000 g.p.d. The water is not provided with treatment.

II Water Pollution

In the rural areas, sewage treatment is mainly provided by means of septic tank and field tile systems. These serve residential and commercial buildings. In the more populated sections of the township it was reported that domestic and industrial wastes were being discharged into surface water drains. This subsequently produces undesirable conditions in the receiving stream.

Sources of pollution were investigated in the various townships.

Dorchester South Township

Police Village of Belmont - The municipal storm drain was found to be contributing to the gross pollution of Kettle Creek. Several homes were reported to be directly connected to the drain.

The Borden Company plant was investigated. Further treatment of the waste is required. Laboratory analyses of samples obtained during the survey are as follows:

Location	Sample Number	5 Day B.O.D. (ppm)	Solids (PPM) Total	Susp.	Diss.	Coliform M.P.N.
Plant drain at outfall	K51	16	262	10	252	24,000,000

It was reported that a new disposal system is to be installed.

Belmont Results

Location	Sample No.	5 Day B.O.D. (p.p.m.)	Solids (p.p.m.) Total	Susp.	Diss.	Coliform M.P.N.
Above Borden drain	K52	4.1	444	58	386	240,000
At Borden drain	K53	16.0	262	10	252	24,000,000+
Below Borden drain	K54	5.8	406	60	346	2,400,000
Bridge south of Belmont	K55	1.8	456	66	390	24,000,000+
Above Municipal drain	K56	0.9	422	44	278	240
Below Municipal drain	K57	2.2	420	16	404	2,400
1 mile S.W. of Belmont	K58	2.2	416	20	396	24,000,000+

These analyses indicate that Belmont is contributing to the pollution of Kettle Creek. Treatment of industrial wastes from the milk plant should be such that the quality of the receiving stream will not be impaired.

Malahide Township

Port Bruce - This community is mainly a summer resort. Septic tank and field tile systems are employed for the treatment of domestic wastes. The light sandy soil is favourable for the operation of individual sewage disposal systems. Analyses of samples obtained at Catfish Creek in the vicinity of the municipality gave the following results:

Location	Sample No.	5 Day B.O.D. (p.p.m.)	Solids (p.p.m.) Total	Susp.	Diss.	Coliform M.P.N.
Mouth of Catfish Creek	PBC11	5.0	308	64	244	2,400
Bridge on Hwy. 73	PBC12	5.6	328	22	306	24,000
1½ miles west of Pt. Bruce	PBC13	6.8	360	68	292	240,000

These are indicative of pollution.

Yarmouth Township

Mapleton Cheese and Butter Company - Plant wastes are discharged to a three-compartment settling tank and into a drain which discharges into Catfish Creek. The following samples were obtained in the vicinity of the Cheese factory:

Location	Sample No.	5 Day B.O.D. (p.p.m.)	Solids (p.p.m.) Total	Susp.	Diss.	Coliform M.P.N.
Above cheese factory	CT10	4.8	406	114	292	240
Below cheese factory drain	CT11	29,000	113,548	112,122	1426	2,400,000

These analyses indicate an exceptionally strong waste. It is recommended that the company introduce a satisfactory method of waste disposal such as a spray-irrigation system.

Considerable domestic waste from the township in the area east of St. Thomas, known as Yarmouth Heights, is discharged to the Carr drain and Mill Creek. This waste accounts in part for the high coliform counts of the samples Nos. 20 to 26 obtained

in area #8 shown on the accompanying stream pollution survey map.

Some of the septic tanks in this area have direct or indirect connections to old agricultural drains. It has been reported that on several occasions the storm sewer on Wellington St. has been blocked by septic sewage sludge.

The use of septic tanks and tile beds is a satisfactory method of private sewage disposal where houses are sparsely located and the soil conditions are suitable. The extension of water mains into Yarmouth Heights and the increased concentration of houses make it imperative that sanitary sewers be extended into the area.

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